2.0 Project description

2.1 Introduction

The Project description is based on preliminary designs, standard design criteria, input received from engagement processes and construction policies and practices. Final engineering design will be completed upon receipt of *The Environment Act* Licence, and will incorporate any conditions included in the Licence. This section covers the Project planning process, Project components and Project activities.

2.2 Project planning and alternative means

2.2.1 System planning

Manitoba Hydro's System Planning Department begins its transmission line projects with assessing the need for the Project, developing alternative concepts to completing the Project from an electrical transmission system perspective, and identifying a preferred concept. Following this, various departments within the Transmission Business Unit at Manitoba Hydro begin the process of planning the transmission routing process, including defining the start and end points, as well as initial design concepts such as tower design and right-of-way width.

During studies of its existing transmission system to determine the best way to transfer electricity from Manitoba to Saskatchewan, Manitoba Hydro determined that there was the potential for loading impacts and system constraints. The safe reliable transfer of electricity would require a new 230 kV line, including new equipment at Birtle South Station to terminate the new line, as well as replacement of the current transformer at Birtle South Station for an existing 230 kV line (B69R).

2.2.2 Planning surveys

A key input to the planning and design of the Project is the gathering of information during field surveys in the region. Surveys are typically required prior to construction to assist in providing current detailed information to help finalize Project design details and gather final baseline pre-construction information. For some parameters this is an iterative process, where more detailed, site-specific information is gathered as designs and route locations are developed. Surveys to determine the legal boundaries of the land crossed by the transmission line and the precise location of the right-of-way (ROW) on these lands are conducted by licensed Manitoba Land Surveyors. While these

surveys are often conducted from public areas and road rights of way, they may require surveyors to enter private lands. Their entry to these lands is permitted under the Land Surveyors Act of Manitoba.

Other surveys include those of environmental and heritage resources, initially in the broader region and later in the process along the ROW, to confirm specific locations of important resources. They can include geotechnical surveys to confirm soil and subsurface characteristics for structure foundations, and land surveys to establish the boundaries of lands and the location of the transmission line ROW. It is during this survey, one of the last prior to construction start, that tower locations will be established. Where required these activities are regulated through application of permits that specify measures required to protect the environment, and permission from landowners will be sought for any work required on private lands prior to land acquisition. If an easement is in place, Manitoba Hydro has been granted by the landowner the right to access the lands for the purpose of the Project.

2.2.3 Routing alternatives

The system planning process resulted in the establishment of a Manitoba terminus, but efforts were required to establish a border crossing so that SaskPower could connect the line to the terminus in Saskatchewan. As the process used to select a final preferred route for a transmission line provides the first and best opportunity to mitigate any potential adverse effects there was considerable effort invested in the routing process, and this is summarized separately in chapter 6.0 and in more detail in Appendix A. Routing inputs from the public and Indigenous engagement processes are summarized in sections 3.4.4 and 4.4.2 respectively.

2.2.4 Structure options

As with all new transmission projects, structure designs were considered on the basis of several engineering and environmental factors including expected load, conductor sizing, land use and type and soil conditions. Tubular steel H-frame type structures were chosen for suspension structures along road allowance in cropped agricultural areas as they have smaller footprints than self-supporting steel lattice structures and reduce the ROW width requirements allowing the structures to be closer to the road allowance. Foundation type will be selected based on local soil conditions.

Manitoba Hydro has chosen to use self-supporting lattice structures when not adjacent to a road allowance and other areas where longer spans are required, such as river crossings. Self-supporting lattice steel structures allow for longer spans reducing the

total number of towers in fields, and are compatible with multiple technologies that allow foundations to be constructed in different soil conditions.

This combination of lattice steel and tubular H-frame steel structures was designed to be cost-effective and was assessed as having the least effects on existing agricultural land use by maximizing span length and reducing ROW width.

2.3 Project components

The Project consists of the following components:

- Transmission line - new 46.2 km 230kV transmission line between Birtle South Station and the Manitoba border designated as Line B71T; and
- Station modifications - termination at Birtle South Station and replacement of the current transformers for an existing 230 kV line (B69R).

Details of each are provided below.

2.3.1 Transmission line

2.3.1.1 Design considerations

The transmission line design and construction will meet or exceed the design standards as set out by the Canadian Standards Association (CSA 2010), as well as the planning, performance and reliability standards of the North American Electric Reliability Corporation (NERC).

2.3.1.2 Right-of-way requirements

For those portions of the transmission lines where Manitoba Hydro does not presently own the ROW, easements will be acquired from the landowners who have legal entitlement to the land. In the case of privately owned lands, easements are normally secured through an agreement with the property owner (see section 2.4 for details). In the event that an agreement with private landowners is not negotiated, Manitoba Hydro has the right of expropriation. In the case of provincial Crown lands, Manitoba Hydro typically secures the necessary transmission line ROW through Crown Land Reservations, easement agreements or similar arrangements. In all cases, easement arrangements (whether on private or Crown land) are followed up by registration of an easement plan in the appropriate provincial land titles office.

Transmission line ROW widths are based on operating considerations and related safety requirements for a 230 kV AC transmission line on self-supporting and tubular H-Frame towers. For example, to allow for the effects of wind on the conductors

(conductor swing-out), the ROW width must be sufficient under severe wind conditions to provide lateral separation between the conductors and any object located at the edge of the ROW. ROW widths are also designed to avoid damage to adjacent property in the event of a structure failure and to reduce electric and magnetic field (EMF) effects, such as radio interference and audible noise, which decrease with increasing distance from the lines. Related design parameters are based on Canadian Standards Association (CSA) standards, North American Electric Reliability Corporation, Midwest Reliability Organization reliability criteria and internal Manitoba Hydro transmission line design guidelines.

ROW widths also reflect access requirements for line construction and maintenance. Access is typically by surface vehicles and equipment but may also involve helicopters. Access is generally made on or along the ROW from intersecting roadways. However, in cases of remote location or difficult terrain it may be necessary to provide for secondary surface access to, or along, segments of the ROW.

Some sections of the line may require supplementary ROW area for marshalling or supply of construction materials (e.g., aggregate for tower foundations), or for construction and maintenance access. Such requirements cannot be identified until post-approval field surveys, detailed design, and construction contract arrangements are finalized. Any related ROW adjustments may involve application for new or extension of existing easements.

Figure 2-1shows three ROW configurations for different segments of the line. The ROW width changes depending on whether it is steel lattice structure (60 m ROW width and easement), a tubular steel H-frame structure adjacent to a road (54 m ROW width, 23.75 m easement), or a tubular steel H-frame structure through private property (40 m ROW and easement).

2.3.1.3 Structures

Manitoba Hydro has selected tubular H-Frame steel and lattice steel structures for this Project. Typical tubular H-frame and self-supporting lattice structure are illustrated in Figure 2-1.

Generally, three types of tower structures will be used for the new tower construction:

- Tangent towers – installed in straight sections of line;
- Angle towers – located where there is a change in route direction and are subject to additional longitudinal loads arising from the tension of the conductors; and
- Dead-end towers - towers at the terminations of the line subject to loads arising from the unbalanced effect of conductor tension on one side of the structure.

Angle and dead-end tower types are designed for more complex forces that typically require greater structural strength and larger footprints than required for tangent towers. These stronger towers are a design consideration to mitigate the effects of extreme weather events capable of causing multiple tower failures and for deflecting the transmission line.

Special crossing structures will be designed to mitigate overhead clearance issues and riparian setbacks necessary in specific circumstances (e.g., long span crossings of major rivers or roadways, or crossings of other transmission lines). Such structures typically require greater height, greater strength and heavier construction, but will otherwise be similar to other structures.

Based on preliminary design it is estimated that the transmission will require the following:

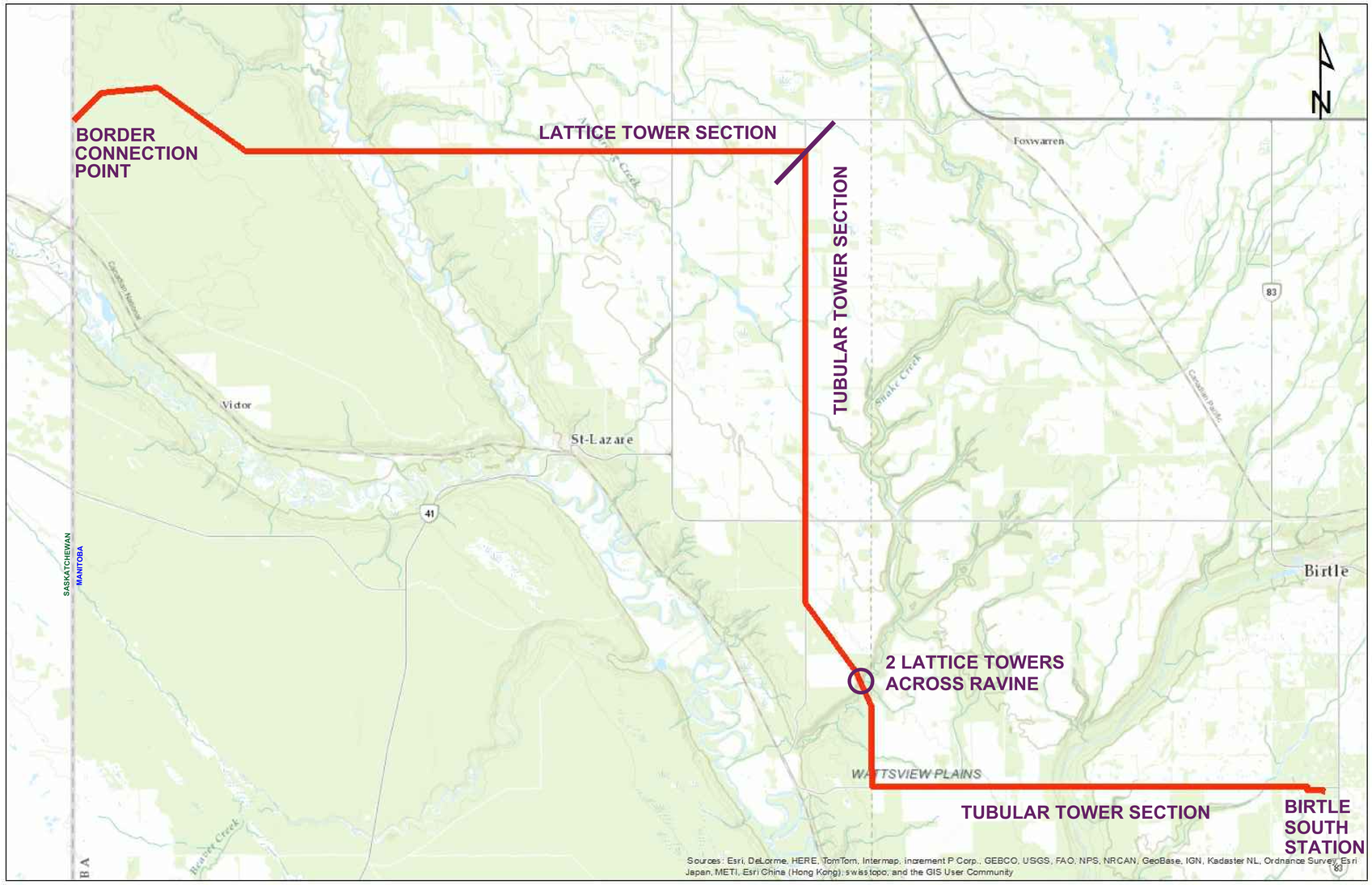
- Tubular structures (line length 26.75 km):
    - 98 tubular steel self-supporting tangent towers;
    - one tubular steel self-supporting light angle tower;
    - Four tubular steel self-supporting heavy angle towers;
    - Four tubular steel self-supporting dead-end towers;
- Lattice structures (line length 18.8 km):
    - 42 steel lattice tangent towers; and
    - Four steel lattice heavy angle towers.

2.3.1.4 Conductors and Insulators

Line B71T will be a single-circuit line configuration consisting of three 795.0 MCM 26/7 Aluminum Conductor, Steel Reinforced (ACSR) conductors. Each conductor will consist of aluminum strands wrapped around a centre core of steel strands and will be suspended from each structure by insulator strings.

2.3.1.5 Ground Wire

Two ground wires (skywires) will be strung at the peak of the transmission structures to provide, communication, grounding and lightning protection. One of these ground wires will be a ground conductor (size 9, 7-strand steel), and one will be an Optical Protection Ground Wire (OPGW) that will be used to transport communications signals for the control and protection of the line.



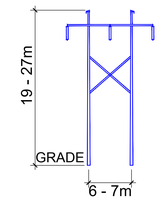
T/L DESIGN

- LINE LENGTH - 46.2 km
- RIGHT-OF-WAY
  - TUBULAR - 40m EASEMENT LOCATED ON PRIVATE PROPERTY (3.0 km OF TOTAL LINE LENGTH)
  - LATTICE - 60m EASEMENT LOCATED ON PRIVATE PROPERTY (18.8 km OF TOTAL LINE LENGTH)
  - TUBULAR - 23.75m EASEMENT ADJACENT TO ROAD ALLOWANCES. (24.4 km OF TOTAL LINE LENGTH)
- LENGTH OF AVERAGE SPAN - 260m TUBULAR
  - 450m LATTICE
- PHASE CONDUCTOR - 795.0 MCM 26/7 ACSR (DRAKE)
- GROUND CONDUCTOR - SIZE 9 - 7 STRAND STEEL - ONE POSITION.
  - OPGW - ONE POSITION.
- 4 - HIGHWAY CROSSINGS
- 1 - NAVIGABLE WATER CROSSING (ASSINIBOINE RIVER)
- 12 - DISTRIBUTION LINE CROSSINGS
  - 4.6 km DISTRIBUTION LINE RELOCATION
- ANTICIPATED CLEARING - 50ha

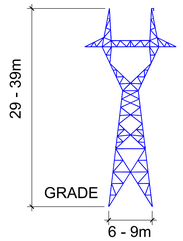
STRUCTURE QUANTITIES

TUBULAR
- 98 - TA-208 - DIRECT EMBEDDED
- 1 - TB-203
- 4 - TD-200
- 4 - TF-205

LATTICE
- 42 - A-210
- 4 - D-202



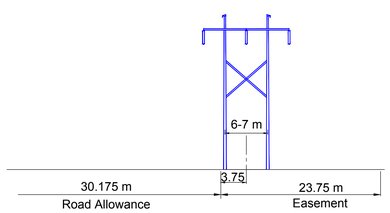
TA208
STRUCTURAL STEEL LAYOUT



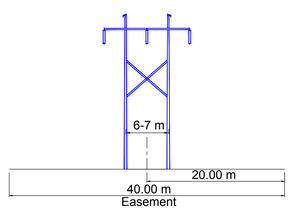
A210
STRUCTURAL STEEL LAYOUT

PRELIMINARY PREFERRED ROUTE - BORDER CONNECTION POINT

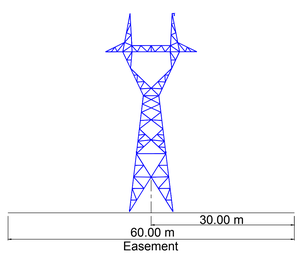
PROPERTY REQUIREMENTS



TYPICAL CROSS-SECTION ADJACENT TO ROAD ALLOWANCE



TYPICAL CROSS-SECTION LOCATED ON PRIVATE PROPERTY



TYPICAL CROSS-SECTION

DISCLAIMER:

THIS DRAWING SHALL BE USED FOR ESTIMATING PURPOSES ONLY. ALL INFORMATION CONTAINED WITHIN THIS DRAWING SHALL BE CONSIDERED PRELIMINARY AND IS SUBJECT TO CHANGE. CONTACT THE TRANSMISSION AND CIVIL DESIGN DEPARTMENT FOR THE LATEST REVISION.

REV.	DATE	DESCRIPTION	BY	CKD.	APP.

Manitoba Hydro

AUTHENTICATION FOR CURRENT REVISION

DRAWN: MB	CHECKED:	SCALE: NTS
DESIGNED:	DATE: 2017 04 19	

BIRTLE SOUTH - TANTALLON 230 kV T.L.

Figure 2-1: Right of Way Requirments

DRAWING NUMBER	SHEET	REVISION

ISO A0 (48.8 x 33.1)

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2.3.2 Birtle South Station modifications

The Birtle South Station is located 4.8 km south of the Town of Birtle on Highway 83 (Map 1-1). Station modifications will be required to facilitate the termination of the new Project transmission line (B71T), as shown in Figure 2-2. Upgrades at the station will include additional equipment to terminate the new line as well as revisions to the protection and communication systems. The equipment will include two new 230kV breakers and several transformers, switches and other electrical components. All station modifications and equipment additions will be within existing Manitoba Hydro property and within the fenced area of the station.

Figure 2-2: Birtle South Station modifications

2.4 Easement procurement procedures and compensation

Typically, once the final preferred transmission line route is determined (described in Chapter 6.0) Manitoba Hydro begins the process of acquiring easements from landowners. In the case of privately owned lands, easements are secured through a right-of-way (ROW) easement agreement with the property owner.

The conventional terms of the ROW easement agreement provide that:

- Manitoba Hydro acquires the right within the easement area to construct, operate, inspect, maintain and repair and replace the transmission line. This

includes the right of access by personnel and equipment as required during construction and into the future. Land rights secured by easement are permanent and will survive any future real estate transaction.

- The landowner retains title to the land and can continue to use the land (i.e., for farming, grazing or other uses) as long as the activity is compatible with Manitoba Hydro's operational requirements including a need for unlimited access and certain restrictions that ensure electrical safety. For example, landowners are typically not permitted to plant trees, construct buildings or place structures within the easement area without approval from Manitoba Hydro. The same rights and restrictions are extended to a subsequent land owner after any future real estate transaction.

There are several forms of compensation available to landowners who sign easement agreements. These include:

- Land compensation;
- Structure impact compensation;
- Construction damage compensation; and
- Ancillary damage compensation.

Land compensation is the primary form of compensation associated with an easement agreement. Land compensation is a one-time, lump sum payment to a landowner for granting of an easement for a transmission line ROW. Manitoba Hydro's policy is to pay 150% of market value (based on an appraisal report from an accredited property appraiser) for the easement, with half paid on signing and the remainder paid once the agreement is registered with the Land Titles Office.

Structure impact compensation is provided where transmission infrastructure (towers) will permanently affect agricultural operations. Structure Impact Compensation is a one-time lump sum payment to landowners for each transmission tower placed on land classed as agricultural. The level of structure impact compensation depends on the nature of farm practices, the type and size of the tower and the location of the tower relative to property lines and field edges. Structure Impact Compensation covers crop losses on lands permanently removed from production, reduced productivity and increased operational costs within the zone of influence of each tower. Crop loss calculations are based on crop insurance data or the actual per-bushel value of the harvested crop as determined by Manitoba Agricultural Services Corporation (MASC). Compensation equates to the difference in actual productivity within the zone of influence of a given tower and productivity of adjacent, unaffected crops (or the expected productivity absent the tower). Structure impact compensation is typically

calculated in advance of construction and paid upon construction of a tower's foundation.

Construction damage compensation is provided to landowners who experience damage to their property due to the construction, operation and maintenance of the transmission line. Payment for construction damage is negotiated on a case-by-case basis and may be applicable at the initial construction stage as well as into the future as maintenance and repair activities arise. Manitoba Hydro will compensate for crop loss associated with construction and will either compensate or repair any damage to a landowner's property including costs to repair access corridors and farming costs associated with chemical re-application or rejuvenation of compacted top soil.

Ancillary damage compensation is provided to landowners when Manitoba Hydro's use of the ROW directly or indirectly affects the use of the property. Ancillary damage compensation is negotiated on a case-by-case basis and is based on evidence of actual affects (invoices, etc.). Ancillary damage compensation may be considered for cases such as when the transmission line adversely affects irrigation and drainage, restricts access to adjacent lands, restricts operations such as aerial spraying, and reduces traditional highest and best use of land.

2.5 Manitoba Hydro's agricultural biosecurity policy

Manitoba Hydro's Agricultural Biosecurity Policy was created to prevent the introduction and spread of disease, pests and invasive plant species in agricultural land and livestock operations. Manitoba Hydro employees and contractors will follow this corporate policy and the Transmission Business Unit Agricultural Biosecurity Standard Operating Procedures (SOP). In relation to this policy, agricultural land is defined as land zoned for agricultural use by the provincial government, planning commission or planning district.

Manitoba Hydro staff and contractors have the potential to affect agricultural biosecurity through construction activities that require access to agricultural land. Acknowledging this risk, the purpose of the agricultural biosecurity corporate policy is to make sure Manitoba Hydro staff and contractors take necessary precautions to protect the health and sustainability of the agricultural sector.

The transmission SOP and the training associated with it apply to all the employees of Transmission Business Unit as well as external contractors or consultants who conduct work on behalf of the Transmission Business Unit and are required to enter agricultural land. The SOP includes procedures to provide guidance and direction to staff and contractors/consultants who may be required to enter agricultural land and the levels of cleaning necessary to reduce the likelihood of soil and manure transport of invasive

species, pests or disease. More information on the SOP is provided in chapter 10 (Environmental Protection, Follow-up and Monitoring).

2.6 Project activities

2.6.1 Overview

After a brief overview on construction schedule and workforce, this section is organized into discussion on the following:

- Transmission line construction activities;
- Transmission line operation and maintenance activities;
- Transmission line decommissioning;
- Station modifications activities;
- Station operation and maintenance activities; and
- Station decommissioning.

2.6.2 Construction schedule and workforce

Table 2-1 provides the anticipated construction schedule along with the workforce requirements for each phase. Transmission line construction is currently scheduled to commence in December 2019 and be completed by March 2021, primarily during two winter periods. Work at Birtle South Station is currently scheduled to commence in August 2019 and be completed by November 2020.

Table 2-1: Construction schedule and workforce

	2019					2020											2021			Workforce
	August	September	October	November	December	January	February	March	April	May	June	July	August	September	October	November	December	January	February	March	
Transmission construction activity																				
Mobilization																				10-15
Accommodations																				NA
Site Access																				NA
Marshalling yards																				NA
ROW clearing																				10-15
Foundation installation																				20-30
Tower installation																				50-60
Conductor installation																				40-50
Demobilization																				10-20
Station construction activity																				
Station modifications																				10-20

NA – Not applicable

2.6.3 Transmission line construction activities

2.6.3.1 Overview

Transmission line construction activities will consist of the following:

- Mobilization to site;
- Use of local accommodations;
- Establishing access;
- Establishment and use of marshalling yards;
- Right-of-way clearing;
- Use of borrow sources;
- Foundation installation;
- Structure installation;
- Conductor installation; and
- Demobilization.

2.6.3.2 Mobilization to site

Prior to Project construction the workforce and materials need to be brought to the construction area. Mobilization includes the movement of Manitoba Hydro and contract staff, vehicles, equipment and materials to the job site. Generally, mobilization is ongoing throughout the clearing and construction phase as different types of equipment and materials are required for specific activities such as clearing, tower construction and conductor stringing.

Transmission line construction will begin once the ROW is prepared and the various construction equipment and vehicles will be mobilized to the Project site to complete the various tasks. Clearing and construction equipment can include the following:

- Mulchers and feller bunchers;
- Materials delivery trucks and trailers;
- Drill rigs and concrete trucks for cast-in-place piles;
- Backhoes with attachments for installing re-bar cages for piles;
- Backhoes with specialized heads for installing screw piles;

- Welding trucks and equipment;
- Loaders and cranes for assembling and erecting towers;
- Stringing equipment such as tensioners and pullers;
- Helicopters; and
- Other smaller equipment for transportation and other minor tasks as required.

2.6.3.3 Accommodations

It is anticipated that clearing and construction workers will be housed in suitable accommodations available in local communities where feasible and practical, with the possibility of mobile construction camps if required. If needed, mobile construction camps would include sleeper units, a wash car, cooking and eating trailers, offices and a machine/parts shop. Camp size could be in the range of 50 to as many as 75 workers, but will vary according to the activity, contract size and labour force requirements.

Mobile construction camps will generally be located in well-drained areas within the ROW or in pre-disturbed locations with access to electrical supply. Additional clearing may be required, however, to facilitate vehicular traffic, transportation and distribution of construction materials, and installation of temporary maintenance shops, kitchens, sleeping quarters, and offices.

Specific mobile construction camp locations will be determined after final Project planning and design is completed. Potable water will generally be transported to the camps and stored in cisterns. Wastewater will typically be stored in licensed holding tanks that will be pumped and disposed of at licensed waste-disposal grounds to limit the potential for surface or groundwater contamination.

All mobile construction campsites will be restored to pre-Project condition with the exception of vegetation, which will be allowed to regenerate naturally on the sites.

2.6.3.4 Establishing access

Access for construction and subsequent line maintenance activities will generally occur along the ROW using existing public access roads or trails wherever possible. This enables maximum use of existing road access and limits the requirement for the development of new temporary trail access, and the associated environmental effects. Minor deviations (bypass trails) from the ROW may be necessary in severe terrain conditions. Permission will be requested from landowners for use of roads or trails on

private property, if these are required. Unless required for ongoing maintenance, the ROW access trails will not be regularly maintained post-construction.

As indicated, if required, provincial permits will be secured for access to the ROW from provincial Crown lands. Construction activity and access requirements will be subject to standard environmental protection measures associated with Manitoba Hydro's transmission line construction practices. These will be identified and cross-referenced in a site-specific Environmental Protection Plan, as described in chapter 10, and adherence to them will be stipulated in related contract specifications.

Equipment access and construction activities will be carried out in a manner that will limit disturbance to riparian areas.

2.6.3.5 Establishment and use of marshalling yards

Marshalling yards will typically be established near the transmission line route for the storage of construction materials and equipment and for further deployment to the construction site. The exact number and location, and size of marshalling yards will be determined during the course of developing detailed construction specifications and contract arrangements. They will be sited on existing cleared or previously disturbed areas and decommissioned following specifications in the Environmental Protection Plan (chapter 10).

2.6.3.6 Right-of-way clearing

The ROW will be cleared to accommodate the Project. The ROW will be cleared of trees and understory to allow for safe and reliable operation of the transmission line. Clearing will be modified in environmentally sensitive areas (e.g., river and stream crossings) and will be subject to a variety of pre-determined but adaptable environmental protection measures (described in chapter 10).

Clearing requirements for the new transmission line rights-of-way will also require selective clearing of danger trees beyond the ROW. Such trees could potentially affect the function of the transmission line or result in safety concerns, and are normally identified during initial ROW clearing activities and removed.

A variety of methods is available for ROW clearing. Typically, these include conventional clearing done by V and KG blades on tracked bulldozers, mulching by rotary drums, selective tree removal by feller bunchers (e.g., for removal of danger trees with minimal adverse effect on adjacent vegetation and trees) and hand clearing with chain saws in environmentally sensitive sites.

Final clearing methods will be determined based on detailed surveys of the transmission line route, and site specific identification of environmentally sensitive features. Ground vegetation will not be grubbed except at tower sites and along centerline trail, where stumps and roots will be removed to allow unencumbered access for equipment and safe walking areas for workers.

Disposal of cleared vegetation typically involves a variety of options including piling and burning, mulching, collection and secondary use by local communities (e.g., firewood), or salvage and marketing of merchantable timber resources if feasible. The final decision for disposal of vegetation will be determined based on the method of clearing used and the license/permit conditions applied to the Project.

2.6.3.7 Use of borrow sources

Aggregates required for use in foundation construction will generally be transported from established and appropriately licensed sources offsite. Suitable material for backfilling excavated organic soils may be obtained from newly developed borrow areas along the ROW.

Potential borrow locations have not been specifically identified. Typically, borrow pit locations will be located along the ROW to limit environmental disruption, haul distances and cost. Where suitable sources are not available along or close to the ROW, nearby deposits may have to be identified and the surrounding vegetation cleared to gain access. Normally, rubber-tired dump trucks are used to transport gravel and fill materials.

Selection, development and reclamation of new borrow sites will be undertaken in accordance with provincial regulations. Where borrow pits are required, they will be rehabilitated in accordance with *The Mines and Minerals Act.* Any use of explosives during transmission line construction (e.g., in borrow pit operations, foundation installation, conductor splicing) will be made in accordance with all applicable legislation and regulations, including acquisition of permits.

2.6.3.8 Foundation installation

Final foundation designs will be developed after geotechnical investigations, self-supporting lattice steel structures and tubular steel pole structures may be supported by a variety of foundation types including, direct embedded, cast in place, mat or helical pile.

2.6.3.9 Structure installation

Tower structures will be assembled either onsite or assembled as components in a designated marshaling yard, transported to the construction site by truck, and erected by crane. A helicopter may be used for a limited period (several days) as alternative to meet Project scheduled in-service date if unexpected delays or constraints were to occur.

2.6.3.10 Conductor installation

Conductors will be transported to the site in reels, then suspended from the insulator strings, and tensioned by machine to provide the ground to conductor design clearances specified at the mid-span points of maximum sag. To create a continuous conductor the ends of conductor reels will be spliced together by use of implosive sleeves. Any conductor stringing across watercourses during the winter will involve crossing on foot or by vehicle. During months of open water, the conductors will be transported across watercourses by boat.

2.6.3.11 Demobilization

The final step in clearing and construction is the demobilization of a workforce from an area. Demobilization includes the movement of Manitoba Hydro and contract staff, vehicles, equipment and materials from the job site, as well as the clean-up (and if required rehabilitation) of marshalling yards, borrow sources and access routes.

Once the transmission line is constructed, all excess materials and equipment including debris, and unused supplies will be dismantled, if required, removed from the site and disposed of according to provincial and municipal regulations. Rehabilitation of any disturbed sites will be undertaken as required.

Generally, demobilization is ongoing throughout the clearing and construction phase as different types of equipment are required for specific activities such as clearing, tower construction and conductor stringing. Construction clean-up will occur throughout clearing and construction.

Waste disposal will be undertaken in accordance with provincial and municipal regulations, and by-laws. All clean-up and rehabilitation activity will be subject to the requirements of the Environmental Protection Program, described in chapter 10. All non-toxic materials will be disposed of using existing, appropriately licensed local facilities. Material supply and waste handling will be subject to conventional Manitoba Hydro codes of practice and relevant provincial and federal legislation.

2.6.4 Transmission line operation and maintenance

2.6.4.1 Overview

The transmission line will be designed to operate continuously, although the actual flow of electricity will vary with load requirements. In order to maintain the transmission line in a safe and reliable operating condition, regular inspection and maintenance must occur. This will include inspections of ROW vegetation as well as structures, hardware and station equipment, and the management of vegetation. This section begins with a summary of workforce and schedule, followed by descriptions based on current design and on prior experience with similar projects and conditions.

2.6.4.2 Workforce requirements

Workforce requirements associated with the operations and maintenance of a particular transmission line generally involve deployment of established regional operations and maintenance personnel, and contractor staff as required. The workforce for regular maintenance activities could be between three and five workers. During emergencies, the size of the workforce is largely dictated by the work required.

2.6.4.3 Inspection patrols

Manitoba Hydro conducts annual inspections of all its transmission lines and ROWs that are 230 kV and greater. Maintenance procedures are well established and are the subject of continuously updated corporate guidelines for maintenance and construction activities. The patrols typically include visual inspections of vegetation management status, structures, foundations and insulators, as well as the removal of any ice build-up. Following the patrol, all pertinent information and findings are entered into a transmission line management database program. From this central database, annual maintenance activities are identified and tracked.

Maintenance activities include instances where crews are required to obtain access to specific areas to repair deficiencies on the transmission system. An annual patrol is conducted either by ground or by air depending on access, geographic conditions and time of year. Non-scheduled patrols may be conducted if the Manitoba Hydro System Control Center identifies a fault on the line that requires visual inspection. Crews also triage infrastructure during emergencies to address line outages and tower damage.

Patrols are normally undertaken by snow machine, all-terrain vehicles, light trucks or helicopter, depending on the geographical location and ease of access. Maintenance repairs are typically carried out during winter, after frost has entered the ground, using

heavier soft track equipment to gain access. When summer access is required in agricultural areas, related maintenance activities are planned, wherever possible, to avoid conflict with farm activity.

In circumstances where maintenance activity requires the use of access trails off the ROW (e.g., difficult terrain), approval is first obtained from Manitoba Sustainable Development, when on provincial Crown land. In areas where access to or across private lands is required, or if working within private lands under easement, the landowners are contacted in advance.

2.6.4.4 Maintenance Activities

Maintenance procedures are well established and are the subject of continuously updated corporate guidelines for maintenance and construction activities. Maintenance activities are typically infrequent and include instances where crews are required to obtain access to specific areas to repair deficiencies on the transmission system. Maintenance repairs are typically done during winter, after frost has entered the ground, using heavier soft track equipment to gain access. When summer access is required in agricultural areas, related maintenance activities are planned, wherever possible, to avoid conflict with farm activity.

2.6.4.5 Vegetation management

Vegetation management within the ROW is required for public and employee safety, as well as the reliable operation of the line. The ROW will be maintained on an ongoing basis throughout the life cycle of operation. Regular vegetation management is required on an ongoing basis to make sure that regrowth in the cleared ROWs does not interfere with transmission line operations. Related management procedures extend to periodic review and removal of danger trees in the immediate vicinity of the ROW.

Manitoba Hydro is also subject to North American Electric Reliability Corporation (NERC) reliability standard requirements, which have been adopted in Manitoba under the Reliability Standards Regulation (Manitoba Regulation 25/2012, under the *Manitoba Hydro Act* [C.C.S.M. c. H190]). In addition, the Agricultural Biosecurity Policy and Standard Operating Procedures (Manitoba Hydro 2017a) will be applied. The policy is designed to prevent the introduction and spread of disease, pests and invasive plant species in agricultural land and livestock operations.

The method and timing of vegetation maintenance depends on a number of factors such as the species present, growing conditions and density of the non-compatible species. It may also depend on the existing plant community, terrain, economic

feasibility environmental sensitivity and the ownership for the ROW and adjacent property.

Integrated vegetation management involves a variety of methods, including hand cutting (e.g., using chainsaws, brush saws, axes, or brush hooks) and mechanical shear blading using V or KG blades. Brush mowing with rotary and drum cutters (typically rubber-tired equipment), and herbicide treatments are also used. The methods above are typically conducted on foot, or by all terrain or flex-tracked vehicles. In agricultural areas, vegetation management schedules are adjusted to accommodate farming schedules. The vegetation maintenance brushing cycle for transmission line rights-of-way typically ranges between 8 and 10 years.

This integrated vegetation management approach is used in order to maintain a safe, reliable and uninterrupted transmission of electric energy. The focus of vegetation management is on the tall growing tree species that have the potential to grow or fall into, or within, the arcing distance of the transmission lines and or facilities and cause an outage. The management practices that may be used to control vegetation incorporate mechanical, chemical, biological or cultural options depending upon a number of factors including site conditions and the sensitivity of surrounding areas.

Herbicide treatments are formulated to target undesirable tall growing trees but are also effective on broadleaf weeds, leaving grasses unaffected. Foliar applications of herbicides are applied during the warmer months while dormant stem applications are typically applied in the fall and winter. Permits for pesticide use are obtained as required. The process involves public notification as part of the formal permit application to Manitoba Sustainable Development Pesticide Approvals Branch. All herbicide applications are completed and supervised by licensed applicators and in accordance with conditions specified in the Pesticide Use Permit.

Herbicide application rates at Manitoba Hydro are established by the Chief Forester in accordance with product label instructions. Only herbicides that have been listed in the Pesticide Use Permit are used by Manitoba Hydro. Manitoba Hydro has developed a pesticide applicator requirements document for employees that provides regulatory and applicator licensing information, technical guidance, safety requirements, and checklists for line managers responsible for pesticide application for facilitating compliance with legal requirements. In addition, the document provides information so that consistent pesticide management is conducted at all Manitoba Hydro facilities in such a way that the resulting environmental effect is minimal.

In addition to tree control, weed control on the ROWs may be required under *The Noxious Weeds Act* (C.C.S.M. c. N 110). In agricultural areas, continued cultivation will reduce the need for weed control. Alternative techniques for the uncultivated portions of

the ROW include mowing and herbicide spraying, which is the most effective method to control weed growth. Spraying equipment includes backpack sprayers, truck-mounted power sprayers equipped with a broadcast applicator system, hose and handgun, and all-terrain vehicle mounted power sprayers.

Prior to any vegetation management work on private land under easement agreement with Manitoba Hydro, the land owner will be notified. On provincial Crown lands, a work permit issued under *The Forest Act* (F150) is required. As indicated, Manitoba Hydro's Chief Forester is responsible for obtaining the necessary Pesticide Use Permits and submitting Post Seasonal Control Reports as per Manitoba Regulation 94-88R under *The Environment Act*.

2.6.5 Transmission line decommissioning

The Project has been designed to remain in service for several decades and with regular maintenance could be operated indefinitely. Should the transmission line be decommissioned at some future date, Manitoba Hydro will apply acceptable means for environmentally restoring Project sites and ROWs.

Current methods of transmission line decommissioning entail the dismantling of the structures and salvage or disposal of all steel structure components, as well as removal and salvage of insulators, conductors and ground wires. Decommissioning of ROWs currently involves clean up and remediation to a standard commensurate with local environmental conditions, including the applicable land use and policy in effect at the time of decommissioning.

2.6.6 Station modifications

2.6.6.1 Overview

As indicated previously, modifications are required at Birtle South Station to facilitate the termination of the new Project transmission line (B71T). Upgrades at the station will include additional equipment to terminate the new line as well as revisions to the protection and communication systems. The equipment will include two new 230kV breakers, several transformers (e.g., current transformers, potential transformers), switches and other electrical components.

2.6.6.2 Site access

Birtle South Station is located on PTH 83 with existing access directly off the highway. No access upgrades will be required for this part of the Project.

2.6.6.3 Activities

All station modifications and equipment additions will be conducted on existing Manitoba Hydro property, within the fenced area of the station. Activities will include the installation of an 8 m x 8 m blast wall between an existing transformer and the new line, a 40 m long 0.6 m wide cable trench, and foundations and support structures for the new electrical equipment (transformers, circuit breakers, etc.).

Concrete piles and slab on grade foundations will be required to support installation of structures and equipment at the station. Foundations to attach steel lattice structures will largely consist of concrete caps on deep piles at all column locations. Slab on grade foundations without piles will also be used for low-seated equipment such as station service transformers.

A variety of steel structures will be installed at the site for new equipment. Standalone equipment required for the station will have steel supporting structures that are manufactured, supplied and then attached to foundations (e.g., breakers). Tubular steel stand structures will be used to support the new equipment. The tubular steel structures will range in height from 3-7 m. Taller steel lattice structures approximately 6-15 m tall will be used to accommodate clearances for required voltages on some of the electrical equipment (e.g., bus conductors).

2.6.7 Station operation and maintenance

Once work is complete, the station will operate 24 hours a day, year round. No permanent staff are required at Birtle South Station. Qualified maintenance personnel will routinely inspect and maintain the site and, in the case of contingencies, correct any problems or related environmental effects.

2.6.8 Station decommissioning

Should the station be decommissioned at some future date, Manitoba Hydro will apply acceptable means for environmentally restoring Project sites and ROWs. The overall objective of any decommissioning plan would be to restore the station site to a condition consistent with the future intended use of that site. Station components and site improvements would be salvaged, removed and disposed of in compliance with all relevant regulations. Depending on the extent of any surface contamination onsite (e.g., petroleum contamination in soils), remediation would occur to correct any residual effect. A careful investigation of containment parameters, future land use, site risks, and remedial technologies would be conducted as part of the development and implementation of a remedial action plan.

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